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SOIL CONSERVATION

SOIL CONSERVATION

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★ THIS MONTH ★

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INTERLOCKING PROGRAMS.—"Research, education, technical services, and cost-sharing all are designed to help preserve or restore the physical characteristics of our agricultural lands so that a stable agriculture will be assured."
—National Bulletin, ACPS, 1957

LIMING.—Putting all the lime on a field before plowing is as good as the split-application method, according to University of Wisconsin soil scientists J. R. Love, A. E. Peterson, and L. E. Engelbert. They have found that the important thing is to mix the lime thoroughly with the soil.

On one field, all the lime was put on and disked in before plowing. On another, the lime was put on and disked in after the field was plowed. On the third, the researchers used the split application.

All the fields were seeded to alfalfa in 1952. In the second year of alfalfa, the researchers made stand counts and found no difference for any of the treatments.

Total hay yields for the 3 years were the same for the split-application method and where all the lime was applied before plowing, the researchers say. Where all the lime was put on after plowing, hay yields dropped about one-quarter ton a year.

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—Contour lister furrows holding water for crop production and watershed protection in western Oklahoma.

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Land Judging Expands

Land appreciation schools and land judging contests become more popular from year to year in all sections of the country.

By TOM DALE

EDD Roberts competed in livestock judging, poultry judging, crop judging, and various other judging contests throughout his college career. He thought he learned a great deal about better crops and livestock from these contests. The direct competition against fellow students spurred him to study harder and listen more intently to his instructors.

Soon after he became Extension Soil Conservationist for Oklahoma, in 1937, Edd began to search for ways to teach soil conservation more effectively to the farmers and young people of the State.

Why not have a contest? That should, at least create more interest; and, when you get people interested they are likely to learn. That, says Edd, was his method of reasoning when he set out to promote the first land judging contest of the Nation. He got together with Harley Daniel, who was director of the soil conservation experiment station at Guthrie, Okla., and the two of them sold the idea to many other conservation leaders of the State.

In October 1941, about 25 farm boys assembled at the experiment station for the first land judging school and contest. The results were gratifying. The contest became an annual affair. Participation increased from year to year. The school and contest was expanded to include adults, both men and women, as well as 4-H Club and FFA members.

The land judging idea met with such great public approval that within a few years many local and area contests were being held. By 1948, such schools and contests had been held in every county and soil conservation district in Oklahoma. In the meantime the idea began to spread across State lines. Roberts gives W. R. Tascher Extension soil conservationist of Washington, D. C., most of the credit for promoting land judging contests in other States. But, Tascher says most of the credit should go to the State Extension soil conservationists, soil conservation district supervisors, and SCS leaders in the States.

By 1951, Roberts, Tascher, and other conservation leaders from various States decided it was time to promote a national land judging contest. They laid their plans. They got a group of Oklahoma City businessmen and the WKY radio and

Activities at the 5th annual land judging contest, near Oklahoma City.

Illinois Future Farmers of America fill out score cards in a land judging contest.

television station to sponsor the event. In 1952, the first National contest was held near Oklahoma City. Its success surpassed all expectations. It, too, became an annual event and continued to grow.

By 1956, land judging schools and contests were being held in 40 States and Hawaii. State leaders estimate that around 175,000 people participated in the local, area, and State land judging activities that year. About 75 percent of these participants were FFA boys, 4-H Club members, and other youth groups. The remainder were mostly farmers and other men, with a smaller number of women and girls.

Promoters of National pasture and range judging contest discuss plans. (left to right) Clarence Bunch, range specialist, Edd Roberts, soil conservationist, and R. E. Chiles, pasture specialist, all of the Oklahoma Extension Service.

Soil conservation districts, Vocational Agriculture instructors, and county agents are the principal promoters and sponsors for most of the local contests. But chambers of commerce, civic clubs, garden clubs, industrial organizations, bankers, radio and TV stations, newspapers, and numerous other organizations also sponsor land judging contests. In some of the contests the prizes are nominal; in others substantial cash or merchandise prizes are awarded to the winners. In all cases, the participants, both young and old, are learning more about how to judge land—how to determine its capabilities, how to use it, and how to care for it.

The sixth National contest is being held at Oklahoma City during the first week of May 1957. Cash awards of $2,500 are being offered to the winning contestants. Roberts thinks this contest will even surpass that of 1956, when 487 contestants from 23 States, and representatives from 15 foreign countries participated.

4-H Club group in Arkansas compete in a land judging contest.

Actually, there will be 5 different contests in this National land judging event. Separate contests will be held for 4-H Club members, FFA members, college students, adult men, and women and girls. The FFA, 4-H Club, and college contests will be for both individuals and teams, a team constituting 4 boys from the same school or county. The other groups compete only as individuals. Each State is limited to 5 each of FFA and 4-H teams in order to expedite things. In most States the teams are selected from area or State contests held prior to the

National contest. Individuals who have previously participated in the National contests are ineligible.

In addition to the land judging contest, the Oklahoma City affair also includes a National range and pasture judging contest. This contest was added a few years ago on demand. It includes identification of desirable range and pasture plants as well as judging differences in range and pasture conditions and capabilities. It has become almost as popular as the land judging contest during the past few years. Local, area, and State schools and contests are now being held in many States. This, also is divided into five separate contests with the same groups participating as in land judging.

The land judging contest itself is fairly simple. The judges, in advance, select four or five fields with varying potentialities. The contestants are given a score card on which they must indicate their judgment as to the capabilities and productivity of each field, and also set forth their suggestions as to suitable cropping systems and conservation measures needed. Their answers are checked against the judges decisions and a score recorded for each contestant on each field. The one who most nearly approaches the judges decisions on all fields wins.

During the 16 years since land judging contests started, they have become almost as popular as livestock judging contests, especially among FFA and 4-H Club members. In several States, land judging has become even more popular than livestock, poultry, or crop judging, because so many people are coming to realize that the land is the basic resource that supports all other agricultural enterprises.

W. R. Tascher, an avid supporter of land, range, and pasture judging contests, states: "We are happy to see the widespread interest and participation in these National, State, and area contests. They are great motivating events. But, there is almost universal agreement by those experienced in land appreciation schools and land judging contests that the major educational values come at the local level, where the would-be contestants get their instruction and training from Vocational Agriculture teachers, county agents, soil conservationists, and conservation-minded farmers and ranchers."

Crops Against The Wind

The farmers of western Texas are making a valiant fight to protect their land against wind erosion, mainly by proper use of crop residues supplemented by emergency tillage.

By C. A. TIDWELL

STUBBLE fires were a common sight in the Plains country of western Texas 10 or 15 years ago. The stubble was burnt to dispose of what was considered worthless residues as the first step in getting ready for the next crop.

This practice has entirely disappeared from the Plains scene. Most farmers now cherish their crop residues—call it "trash" or "litter" if you prefer. It can do wonders to protect the soil against wind erosion, and is of real value in keeping the soil in condition to soak up and store moisture.

Note.—The author is assistant state conservationist, Soil Conservation Service, Temple, Tex.

You can drive mile after mile along the highways in this area now, and see nothing but trash-covered fields. You will also discover that most farmers put forth extra effort to keep the residues—the leaves, stalks, and stubble—on the land to protect the surface of the soil against the wind during the winter and spring months. Furthermore, you will find many farmers trying in one way or another to improve their cropping practices by using grasses and legumes in rotation. This reflects a better understanding of the hazards of farming in this part of the State.

The past 15 years have brought many changes to the agricultural landscape in this broad, almost flat land. Most of the changes have been

Shredded sorghum stalks that serve as a mulch to help protect the land against wind erosion.

in the course of progress. Nearly all of them—but not all—have been good.

One of the things that is not so good has been the trend toward breaking up big ranches into farms. Some of this has been done without considering the limitations of the soil. Owners and operators of some of these new farms are finding that, even where they have irrigation water, trying to farm these soils is very hazardous.

One of the good things has been the gradual disappearance of the one-way plow as the primary farm implement on wheat farms. In its place has come the sweep-type plow that cuts under the soil's surface, leaving surface litter undisturbed while destroying moisture-stealing weeds. A large percentage of the Plains farmers now are using sweep-type plows either alone or in combination with the one-way plow.

Irrigation in this area has doubled and doubled again in the past decade. It has brought about a great change in the economy of much of the country. It has moved northward in recent years into the wheat-growing lands north of the Canadian River.

Cattle still graze large areas of the Texas Plains with large units still in operation. Sheep ranching also is carried on in the southern part of the Texas Plains. But, the conservation ranchers now gear their livestock numbers to the condition of the range in wet years or dry ones. Hence, livestock numbers have been reduced drastically during the recent drought.

Soil conservation districts for a time seemed to be groping in the dark. Now, they seem to realize the size and importance of their assignment. These locally-led districts have taken their places as a guiding force in the Plains agriculture.

For several years, the SCS and cooperating agencies have been keeping a close check on the lands of west Texas where soil blowing is a serious winter and spring problem. In these years the drouth has slowly widened its hold. But, without the great efforts put forth by farmers and ranchers and the work of soil conservation district supervisors, the situation would have been many times worse.

Reports are received regularly on wind-erosion conditions in 68 counties of western Texas each year, from November until June. These are the months when most wind damage occurs. These counties cover more than 41 million acres. Of these, less than 6 million acres were without sufficient protective cover to prevent damage by winds during the past blowing season.

For the remaining 35 million acres of land with good, erosion-bucking cover, we in Texas can give our thanks. On these lands, millions of acres of grain sorghum and other residues have been left undisturbed, or they have been

Blue panicum that was grown in a grass-grain rotation in western Texas.

Stripcropped field of cotton and sesbania, a legume, in western Texas.

shredded and the litter tucked into the soil to anchor it.

A large part of this land is in the Terry, Cochran, Hockley, Blackwater Valley, and Lamb Soil Conservation Districts where, on nonirrigated lands, very little grain was produced last season. The stalks, in spite of the failure of the grain to mature, could have been cut for feed or grazed by livestock. But, much of the residue was left in the field for soil protection.

Large areas in these districts are of such nature that disaster occurs if the land is left unprotected in winter months. This applies to lands under irrigation as well as to nonirrigated lands. These soils must have cover—living or dead—to escape damage.

It is considered something of a phenomenon that such soils can actually start to blow within half an hour or so after a rain. A hard, drying wind can take the moisture out of the soil's surface rapidly, leaving the surface particles of soil to be picked up. But, they seldom blow where adequate cover is left on the surface, as has been the practice of so many farmers.

The heavier, tighter soils in other districts also are vulnerable to the forces of wind and drouth if left unprotected, although they may hold against wind damage for a somewhat longer period.

Several farmers have been growing legumes interplanted in the same row with sorghums. This practice has been followed principally on irrigated land. Additional nitrogen is added to the soil in this manner, and the shading of the ground to prevent evaporation seems to outweigh the additional moisture demands of the legume crops. The grain can be easily harvested without interference with the shorter growing cowpeas or Mung beans. Grain yields have been sustained, and improved soil condition has been the result.

Farmers in the row-crop section still rely heavily on tillage operations for wind-erosion control. Tillage methods are undergoing a change to provide a maximum amount of cloddiness and surface roughness. Chisel- and sweep-type implements are being used in supplementing residues while listers are being used chiefly for seedbed preparation. These methods may be quite effective in wind-erosion control for short periods. Seldom, however, can tillage methods be fully effective if high winds persist throughout the winter and spring.

Some farmers are using millet as a standby crop to get cover. It can be planted in late summer and, on little moisture, will produce enough residue to protect the land until the following spring.

Though we still have some dust storms in Texas, and some farmers and ranchers are not doing all they should to protect their land, the picture as a whole is one to warm the heart of a soil conservationist. It is apparent that the large majority of the farmers in this big area

are making a sincere effort to protect their land. They are finding ways to use their land in harmony with conditions imposed by this fickle climate. They are working toward cropping systems that will leave protective cover, living or dead, on their land at all times.

That is a goal we have been striving for in the Texas Plains—trying to be ready for the dry years and the winds whenever they come, and to make the best use of the moisture we have. And, the results, so far, have been surprisingly good during this worst drought since the settlement of the Plains.

A WOODLAND FARMER

James Parrott, a cooperator with the Willits Soil Conservation District, Calif., appreciates trees. He came from Kansas where trees are scarce. The redwood and Douglas fir of the Pacific coast really look good to him. They also appeal to his wife who was born in South Dakota.

After working in aircraft plants in southern California and spending a period of time of service in the Air Corps, Parrott found 160 acres of timber for sale. He purchased this in 1947 for $5,000. Later, he purchased an additional 200 acres. In 1950, he sold $25,000 worth of stumpage from his acreage. Immediately following this sale, he salvaged all salable logs, putting some through a small portable mill that he constructed himself. This brought in about $20,000 net profit. There is still a good residual stand on the land. His earnings have been applied to the purchase of additional cutover land and equipment.

He now owns about 1,300 acres, most of which is covered by young growth Douglas fir and redwood. Roads are being improved to permit better utilization.

From the beginning of his operations, Parrott sought and followed advice of SCS technicians serving the Willits Soil Conservation District. Practices applied in his woodland include fire protection, selective harvesting of mature trees, thinning of young stands, salvaging of suppressed and defective trees, and fire hazard reduction by cleaning up logging slash. The young trees are now growing at the rate of one inch in diameter per year, following improvement cuttings made in the young redwood stands.

Parrott has a progressive attitude toward his woodland-conservation operations. In 1945, a forest fire burned a portion of the ranch he later acquired. The seed source was destroyed, so planting was necessary on a portion of the burn. He tried planting with Douglas fir seedlings dug up from adjoining areas that were well stocked. This planting was made in 1947 and the trees now are about 30 feet high and growing rapidly.

Mr. and Mrs. James D. Parrott in second growth Douglas fir on their woodland farm.

He tried pruning young redwood trees, but found that this only produced new limbs on the boles of these young stands, and apparently did not add to the main growth. He observed that leaving limbs and tops of trees on the ground caused the buildup of a beetle population that killed many of the Douglas firs. He is currently salvaging these bug-killed trees.

Parrott's present plan is to log and sell about 200,000 board-feet per year. This cut can probably be increased after building up his growing stock.

He has cleared an airstrip and purchased his own plane. This enables him to keep a careful watch over his woodland and spend less time away on business trips.

His present woodland job is cutting diseased and insect-infested trees and salvaging dead and down timber. This material is being stockpiled to be sawed in his own portable mill.

Trees and tree farming have been good business for this family. This was summed up by Parrott when he said, "This is a good place to live. Trees grow so well here that I cannot understand why anyone should waste time and money trying to clear this land. I intend to grow trees."

—ROBERT A. DELLBERG

Interplanting in Corn

Two scientists report on research results of interseeding grass and legume crops in corn.

GRASS CROPS BETWEEN WIDE-ROWS

By W. E. LARSON

THERE has been considerable interest in seeding grain or forage crops between corn rows. Before the tractor replaced the horse, wheat, rye, or a forage crop was often seeded between 40- or 42-inch corn rows with a one-horse drill. As tractors replaced horses this practice slowly died out.

In 1951, however, Springfield and Thatcher, in Ohio, reported that forage stands were frequently improved by widening the corn rows. They also reported that corn yields from wider row spacings were not reduced as much as earlier supposed. This discovery opened up a new line of approach.

If corn-row widths could be widened to 60- or 80-inches, possibly a small tractor could operate equipment between the corn rows during the growing season. In this way forage crops could be planted between the corn rows after the corn was laid by. The forages could be used as green manure or saved for pasture or hay.

Experiments were started, in 1952, by the U. S. Department of Agriculture and the Iowa

Note.—The author is soil scientist, Agricultural Research Service, U. S. Department of Agriculture and associate professor of soils, Iowa Agricultural Experiment Station, Ames, Iowa.

No. 22

This is the twenty-second of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

Legume and grass mixture interseeded in 80-inch corn rows.

Agricultural Experiment Station to determine how successful forage stands were in Iowa when seeded in 80-inch corn rows after the last corn cultivation. Also, to determine how corn yields compared in 40- and 80-inch rows.

During the first few years, the seedings in 80-inch corn rows were made in late June or early July. Forage stands were generally unsuccessful in all areas except the northeast portion of the State. It was found, however, that stands were generally better from seedings made in 80-inch corn rows than in 40-inch rows. Corn yields from 80-inch rows were generally 75 to 80 percent of those in 40-inch rows.

It was thought that better forage stands might be obtained by seeding in midspring or early fall. Thus, the experiments, in 1955 and 1956, were designed to study the effect of dates of seeding forages in 80-inch corn rows on forage stand and on corn yields. This series of experiments pointed out that forage stands were more likely to succeed if made after the first corn cultivation than if made later. In some cases, corn yields were reduced by elimination of the last cultivation, but this reduction was not marked. Meadow seedings, made at corn planting time in 80-inch rows, were generally successful, but corn yields were drastically reduced. Seedings made during August have not been successful during the last 3 years.

While forage seedings in wide-row corn in Iowa have not been too encouraging during the past 4 years, the State has experienced one of the most severe droughts on record in this period. Thus, the experiments may not be a good indication of what can be expected in normal years.

These studies have led to several tentative conclusions. It appears that a corn-row width of from 60 to 80 inches is most desirable. The experiments have indicated that under good conditions corn yields from a 60-inch row will be better than from an 80-inch row. However, increasing the row width to at least 80 inches has advantages; having at least 80 inches between rows is necessary for operations of most small tractors between the rows. This is important, since it is frequently desirable to mow weeds between the rows. In addition, if spring seedings fail, it is then possible to prepare a seedbed for a fall seeding.

Control of weeds is facilitated by use of a corn planter equipped with furrow openers; soil can be thrown into the corn rows to cover weeds without ridging the soil. Ridging should be avoided if hay is to be harvested the following year. Corn populations should probably be about 12,000 plants per acre in 80-inch rows.

It appears that chances of obtaining forage stands are best when plantings are made early. Probably, the seedings should be in early June, after one or two cultivations of the corn. Experience has indicated that a small roller or packer should follow seedings. Cultivation without packing, leaves the soil loose and encourages poor and spotty stands.

LEGUMES SEEDED IN CORN

No. 23

This is the twenty-third of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By ORVILLE E. HAYS

RESEARCH during the past 4 years, in Wisconsin, has shown that corn may be used as a nurse crop for legumes such as alfalfa and clover. Procedures have been developed whereby stands of legumes are as good as those obtained from seeding in small grain.

The corn must be planted in wide-spaced rows for best success in this interseeding. Normal-spaced rows of high-population corn allow insufficient light to the legume seedlings for good growth and survival. Best success has been obtained with corn rows spaced at 60 inches, but with the corn population per acre the same as on 40- or 42-inch rows.

Note.—The author is project supervisor, soil and water conservation branch, Agricultural Research Service, U. S. Department of Agriculture, LaCrosse, Wis.

The plow-plant method of growing corn is well adapted for interseeding, as the corn can be cultivated with less ridging than is usually done. In plow-plant, the land is plowed 1 or 2 days prior to planting corn. If a good job of plowing is done, there is no need for cultivation between plowing and planting. If old hay is being plowed under, it is well to cultivate once with a field cultivator or disk before plowing.

In plow-planting of corn, the tractor wheels and the corn planter are adjusted so that the corn is planted in the tractor tracks. The corn is not cultivated until it is 6 or 8 inches high. Normally, two cultivations are all that are necessary for weed control. The first cultivation fills in the depression caused by the tractor tracks at planting time. At the second cultivation, the cultivator shovels should be adjusted so that the minimum amount of soil necessary for weed control is thrown to the corn row.

If the corn-plant population per acre is the same in the 60- and 40-inch rows, the yield of corn will be reduced by about 10 percent by planting in the wider-spaced rows.

Legumes are interseeded when the corn is 15 to 25 inches tall. Earlier seedings are apt to encourage weed infestation which, if not controlled, will greatly reduce the yield of corn and frequently smother out the legume seedlings. Clipping, or the use of herbicides, will protect the legume seedlings. However, the early seeded legumes, even with weeds under control, will compete seriously with the corn for soil moisture and greatly reduce corn yields. For best results, seeding should be delayed until the corn has been cultivated twice and is at a height of 15 to 25 inches.

Forage crops seeded between 60-inch corn rows.

Second year growth of alfalfa that was interseeded in wide-row corn.

The method of seeding needed for good stands is to a large extent dependent upon soil moisture and climatic conditions at the time of seeding. Broadcast seeding has been found successful either on soils high in moisture, or if adequate rainfall occurs soon after seeding. Complete failures have resulted when the legume seed was broadcast on dry soil. Dry surface soil requires that the soil be packed firmly around the seed.

Two types of seeders have given good results. The cultipacker seeder has been successful even in soil low in moisture. The unit used applies fertilizer in front of the cultipacker and drops the seed between the cultipackers. It is similar to the regular cultipacker seeder but is narrow enough to use between corn rows.

Another unit used with success, even in dry soils, is the mounted grain drill equipped with press wheels. With this unit, the corn can be intersected while it is being cultivated. A drill assembly is removed to allow the corn to pass under the drill. The seed released at this point is broadcast over the row and will, under favorable conditions, germinate and become estab-

(Continued on page 234)

Something Is Happening –

—In Our Small Watersheds

By TARLETON JENKINS

"WATERSHED" is a word that has recently come to life. It is a word that has gained new and more interesting meanings. It suggests changing and challenging ideas for the use and improvement of watershed areas. This new way of looking at watersheds has captured the imagination of citizens in almost every section of the country.

Farmers are farming better in areas where the new watershed principles are being applied. And, both farmers and the residents of nearby towns and cities are enjoying a new freedom from costly floods.

Utilities, highway departments, and railroads are noting fewer interruptions in the services they provide. Municipalities like Duncan, Okla., and Kaufman, Tex., are discovering new sources of much-needed water in the development of their watersheds.

Wildlife has been given a helpful boost with new water sources and with streams returning to primitive vigor, while landowners put forth extra effort to improve habitat and plant food and cover for game. Residents of watersheds have been enjoying near-at-home recreation—fishing, swimming, boating, picnicking, hunting, and the like.

Watersheds are everywhere. Wherever you are, you are bound to be in a watershed if you are on land. The term "watershed" simply means an area that sheds water into a given stream, pond, or lake.

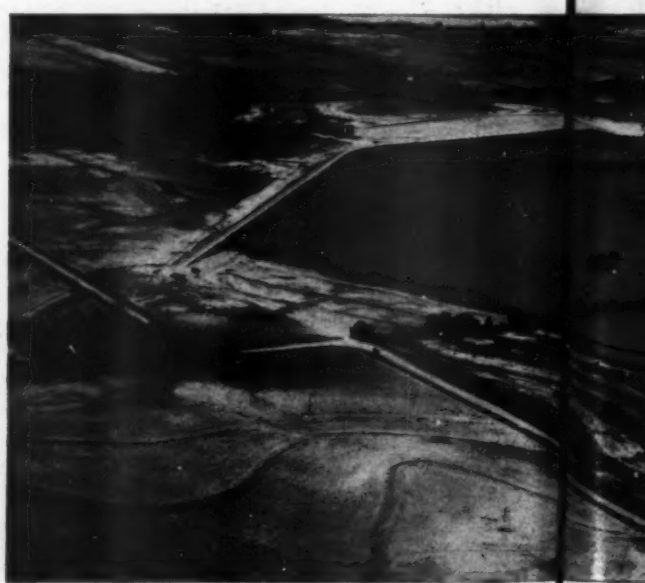
Some watersheds, like the Mississippi, the Colorado, and the Columbia, gather the runoff waters from big patches of the continent. But the big ones are only jigsaw composites of the small watersheds. It is these creek-size watersheds that are now claiming the attention of almost everyone concerned with the use and conservation of water.

There are few parts of the Nation, whether in semiarid regions or in those of higher rainfall, where opportunities for developing small watersheds are not being weighed.

Third Creek, in West Virginia, which drains a watershed of 60,000-odd acres, is one example of how watershed treatment is helping the area's agriculture.

J. W. Lackey, who has 85 acres of land bordering Third Creek, has seen many floods during the 30 years he has farmed there. He has only 8½ acres of bottomland, but it is the best land on the farm.

Not long ago, crews completed a floodwater-retarding structure above the Lackey farm. It is one of 11 designed for Third Creek and its small tributaries. When a 9-inch rain fell in 3 days on the watershed there was no flooding of



Flood prevention structure on Green Creek watershed, Te[illegible] pool w[illegible] rainstorm, when t[illegible]re was ta[illegible]

Note.—The author is information specialist, Soil Conservation Service, Fort Worth, Tex.

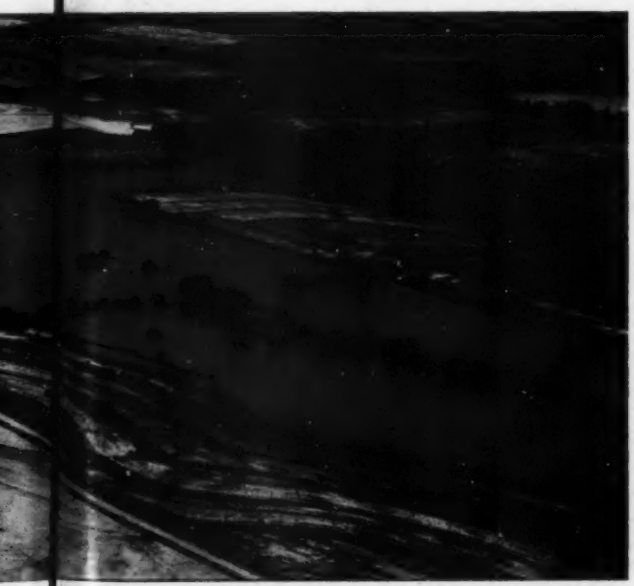
the Lackey bottomland acres. It was the kind of rain that, before completion of the floodwater-retarding work plus the land-treatment measures that go along with it, would have sent Third Creek out over nearly all the bottomlands. The dam easily kept the creek flow within banks.

Mr. Lackey was pleased. "I'm satisfied water would have covered the corn and ruined my crop if it hadn't been for the flood-prevention work," he said.

Will Webb, with 100 acres of good bottomland, Sam Jones, and J. T. Graham, all neighbors of Mr. Lackey, soon can farm their own rich bottomland soils without the threat of floods.

Sandstone Creek in western Oklahoma was one of the first creek-sized watersheds to get the full treatment for flood prevention. By 1952, the 24 floodwater-retarding dams in the Sandstone Creek plan were in place, and the needed soil conservation measures applied on well over half the watershed's 65,000 acres.

Before this, Sandstone Creek had been averaging 9 floods a year. Some were small floods, but they nearly all came during planting or growing seasons. All of the floods took a toll in damage to soil, crops, and property. These floods were costing $60,000 a year on the average.



d, Te pool was filled almost to maximum capacity after a heavy hen t re was taken.

Since Sandstone Creek has had its flood-prevention work, there has been no costly flooding of its bottomlands even though the sudden storms have come about as usual.

In April 1954, for example, a 2.2 inch rain fell. The soil of the drainage area already was saturated with 2 days of rain. And, because of the drouth, vegetative cover was in poor condition. These factors made the runoff of 1.4 inches unusually high for that much rain. Flooding during that storm was limited to 588 acres. Damage was figured at $2,800. Without the soil conservation and flood-prevention work, it was estimated that 2,160 acres would have been flooded with damages of $25,800.

One thing the residents of Sandstone Creek watershed are proudest of is the clear stream that now flows most of the time. In 50 years or longer, it had only flowed during rainy spells. The flow from November 1953 to July 1954, was 234 days at an average of 32.7 acre-feet a day. The flow since that time has been almost continuous.

Some of the farmers in Sandstone Creek watershed report interesting benefits that previously had not been taken into account. They say the water that stands briefly in the detention pool areas, behind the retarding dams, soaks deeply into the land. It has meant unusually good yields in grass.

Green Creek watershed, in west-central Texas has undergone a flood test. It is one of 60 pilot watersheds for which Congress appropriated funds to get the work on small watersheds underway.

Only 3 of the proposed 13 floodwater dams were complete in April of 1956, when one of the intense rains, for which the area is noted, began. However, a large percentage of the needed soil conservation treatment was on the land.

E. C. Johnson, chairman of the Green Creek Watershed Association reported: "In the flood last spring, the value of our cooperative watershed work was vividly demonstrated. Without this work, a large volume of water would have gone into the Bosque River when it was already at flood crest. Damage to the farm lands and to the city of Hico would have been far more devastating. The 3 structures released floodwater at the rate of 18 million gallons a day for 22 days."

Downstream face of Pine Creek flood-detention dam, Walnut Creek watershed, California, with draw-down outlet in foreground.

A Green Creek farmer, J. L. Kiker, said: "This is one of the most beneficial things to come to this community. Protection of the soil is, I think, the biggest benefit. I had to retire my best land to grass years ago because of the flooding. Now I am putting it back into cultivation. The protection of fences is another benefit. Keeping the water in the creek channel keeps all the roads passable, whereas it used to be that for 3 or 4 days after a flood I couldn't get my car away from the house. Then too, you have to consider the fishing, boating, and wildlife we enjoy now. It all makes this community a better place to live, to farm, and to play."

Another of the pilot watershed projects is Walnut Creek in California. It is a small mountain-fed stream with an ugly record for flooding.

In December 1955, flooding was severe through northern and central California. Eight inches of rain fell in 48 hours in the Walnut Creek watershed. A newly completed floodwater-retarding dam held all of the water that came rushing from the drainage area and eased it into the protected channel. The same kind of a storm in 1951 covered 5 blocks of residences with water.

Gerald S. Deardorff, Star Route, Danville, Calif., remembers the 1951 flood vividly: "It was of less intensity than this 1955 storm," he said, "but it was necessary to use boats to evacuate women and children. Water ran up to 4 feet deep in houses."

In a Ventura County survey by farmers and soil conservation engineers, the group was impressed by the effects of good ground cover during the December rains. They reported "amazing amounts of water were soaked up, reducing runoff to such an extent that little damage was done."

The Upper Salt Creek watershed near Lincoln, Nebr., also has a long history of flooding. This watershed is taking on a new look, with a system of floodwater-retarding structures to support the soil conservation measures on the farmlands.

The flood of 1950 was one of the region's most destructive. It ripped up soil, destroyed crops, wrecked buildings and fences, and drowned livestock. Cities and towns downstream suffered, too.

Jerry Kubik's farm was one of those taking a severe beating in the 1950 flooding. "There was just nothing to hold the water on the land," Kubik recalled. "The water came down the hillsides and took out my corn. It cut my new-plowed land away, down to the plow sole. But, this can't happen to me again. All my farming now is on the contour with plenty of protection for the soil from plant cover and residue. Rain soaks in now, and the rest takes its time running off. It takes days for all the water to run off, and when it leaves it is clear water, no longer muddy."

The floodwater dam on Kubik's farm is capable of controlling 3.6 inches of runoff. The dam's site (as are all such upstream structures in the pilot watershed protection program) is in a part of his farm he could easily spare for the purpose. It was steep land—much too steep and broken for cultivation.

The sediment pool behind the dam is stocked with bass, bluegill, bream, and crappie. And, Kubik and his neighbors like to fish.

Water in the sediment pools of floodwater structures has been especially helpful in areas in which rainfall has been below normal.

In the fall of 1954, a floodwater dam was completed on the farm of Glen Aiken in Kansas' Aiken Creek watershed. Since its completion only one rainstorm has produced runoff that

might have been troublesome. It filled the sediment pool of the dam, however.

Since that summer, Mr. Aiken has opened the valve of the structure periodically to keep the waterholes in the creek below filled for use of livestock on his neighbors' farms.

One of the neighbors, Frank Ferguson, said he was able to graze land that would not have been used without the water from the pool on the Aiken place.

Near the northern boundary of Kansas, in the Little Delaware-Mission Creek watershed project, a floodwater-retarding dam was built on the farms of Roy Craig and Fred Gampher. During the building of the dam, a spring was opened and the flow from it now keeps the sediment pool filled to the lip of the drawdown tube, which, in turn, keeps the water level low enough to allow for flood storage.

In 1956, it was an abnormally dry year in that area. The new pool was a lifesaver. The Brown-Atchison Rural Electrification superintendent found a day when his crew was not busy. They built a half mile electric powerline to the site. The Mission Township commissioners installed a pump. Now, many farmers get water from the pool.

Wooden bridge in the Delaware-Mission Creek watershed, Kansas, that was replaced by an earth fill and 42-inch culvert after a flood detention dam was constructed above.

Craig and Gampher have been developing 6 acres near the site for wildlife. They have planted multiflora rose, honeysuckle, lilacs, chokecherry, and honeylocust.

The county bridge below the dam was replaced in 1956. Because of the floodwater-detaining effect of the dam, the county used only a metal pipe 42 inches in diameter. The

Flood-detention structure in the Salt Creek watershed, Nebraska, soon after a 4-inch rain. No flooding occurred below this structure, while the 18 inch draw-down pipe disposed of excess water over a period of several days.

Mr. and Mrs. E. G. Todd stand near pump and pipeline that supply the town of Ramona, Okla., with water from a Double Creek watershed structure.

bridge it replaced was a steel-girder type with 50 planks on the deck. Brown County engineer, Frank B. Reeves, estimates that bridge repairs and replacements over a 10-year period will be reduced by $100,000.

And, there's the experience of the community of Ramona, Okla., north of Tulsa. Ramona's water supply failed, but a crisis was avoided when rancher E. G. Todd told the citizens they could have water from the sediment pool of the floodwater dam on his ranch. They installed a pump and line to the community's system. Todd made no charge for the water.

Carrying out upstream-watershed projects is one of the assignments of the Soil Conservation Service. The program has become one of the most important in the Nation's soil and water conservation jobs.

The program really began in 1947, in 11 major watersheds covering 30 million acres. Then, as public interest heightened, Congress, in 1953, appropriated $5 million to start upstream-watershed improvement and flood-prevention work in 60 pilot watersheds over the Nation.

An objective of the pilot watershed work was to show the benefits from dovetailing soil and water conservation practices and the upstream flood-prevention structures.

In 1954, Congress made it possible for any group of local citizens with watershed problems to solve their problems with Federal help. The legislation passed at that time is called the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Cong.). It was modified by the 84th Congress (Public Law 1018) to make the scope of its assistance to local organizations much broader.

The Watershed Protection and Flood Prevention Act makes it possible for the local groups to: (1) Ask for Federal help in flood prevention, conservation, use, development and disposal of waters; (2) get Federal, technical, and financial help in the planning and installation of the needed works in watersheds, with the local organizations bearing their proportionate share of the cost; and (3) arrange for long-term loans from the U. S. Department of Agriculture to finance local costs.

The size of such projects is necessarily limited. No single structure may have more than 25,000 acre-feet of capacity, with a limit of 5,000 acre-feet of capacity for strictly flood prevention purposes.

The Watershed Protection and Flood Prevention Act has helped to bridge a wide gap in watershed development between conservation work on individual farms and the large flood-control developments on major streams. It has given the word "watershed" a new meaning—a meaning that bears on the future well-being of our vital soil and water resources.

Songbirds in Living Fences

By JOHN T. LINEHAN

NOT all farmers are interested in increasing the number of game animals on their farms, but most of them would be glad to have more songbirds in the fields and fence rows. Researchers at the Patuxent Research Refuge, in Maryland, while studying the effects of conservation farming on wildlife, decided to test how hedges differ from wire fences in attracting songbirds, and what specific kinds of hedges were best from the bird's point-of-view. The results of this research, conducted on 3.4 miles of hedgerows located on 230 acres of experimental farmland, indicate that modern farming practices can do much to add birdlife to the farm.

The study was a simple one. There were four types of habitat to be observed: (1) mature multiflora rose, 7 years old and 9- to 12-feet high; (2) young multiflora rose, 2 years old and 2- to 4-feet high; (3) barbed wire fencing; and (4) other shrub hedges. Three units of each of these types were selected, each 660-feet long. The investigators tried to select typical units that could be compared statistically.

Two observers walked abreast on opposite sides of each row and counted all birds seen. Each unit was censused 6 times, with care being taken to count each strip under the same set of conditions. For example, each strip was counted twice between 7:55 and 8:45 a.m., twice between 8:45 and 9:35 a.m., and twice between 9:35 and 10:25 a.m. The observers changed sides and traveled in reverse directions on succeeding days. The censusing was accomplished on 6 fair mornings within a 9-day period in late May 1954.

At this time of year birds are migrating through the area to northern nesting places. Those birds that do not nest in the Patuxent area, and a few which used the hedges only occasionally for perching, were not included in the summary.

The investigators used statistics to determine what differences in their observations might have resulted from chance, and which indicated significant differences in the kind of hedge studied. From this analysis it was learned that differences in the bird populations of the vari-

Note.—The author is biologist, U. S. Fish and Wildlife Service, Laurel, Md.

Multiflora rose hedges on the Patuxent Research Refuge.

Tartarian honeysuckle hedge on the Patuxent Research Refuge.

ous hedges studied were significant. That is, all mature shrub hedges were more attractive to birds than wire fences, either clear cut or bordered by weeds and tall grass. Tartarian honeysuckle attracted the greatest number of birds, but multiflora hedges contained more species. Nesting birds were less numerous in young multiflora than in mature multiflora or other shrub hedges.

A silky dogwood hedge, used to mark a contour line, looks as if it should provide excellent cover for songbirds. This hedge was 6 years old and was tall and thrifty. As compared with the Tartarian honeysuckle, however, it was used but little by birds. The observers concluded that the dogwood did not provide enough low cover, and that it was not bushy enough to satisfy the birds.

Rugosa rose was available in only one hedge and had not made a good growth. The plants were only 2- to 3-feet high. This hedge was of no apparent value to birds, but the observers could not say whether or not a more successful rugosa rose planting would be beneficial to them.

The study showed that hedges were used by a variety of bird species, twenty-three in all. Fifteen species were of shrub-nesting habits and probably nested in the hedge strips. Song sparrows seemed to prefer the multiflora rose; especially the mature strips. Field sparrows preferred the honeysuckle and dogwood over the multiflora rose.

From this short study, it seems clear that living fences and contour strips serve dual functions. The fences serve to hold livestock in the pasture, and the contour hedges mark the field boundaries along plow lines. However, both kinds of shrubby growth add significantly to the populations of songbirds on the farm. The farmer, in selecting the right planting material, can improve songbirds' environment.

The results suggest that Tartarian honeysuckle could be used to increase the number of birds in living fences or borders by interplantings or additional plantings. Obviously, wire fences are preferable near berry plots where songbirds are a nuisance. None of the bird species using the study hedges normally damage sprouting corn or small grain.

INTERPLANTING IN CORN

(Continued from page 227)

lished. Seed delivered by the other units is firmly pressed into the soil by the press wheels.

Hay yields, from interseeding in corn, have been satisfactory. Even when equipment used did not seed close to the corn row, hay yields have been within 0.2 ton of the production as hay seeded in small grain. Better stands, next to the corn row, result from the use of row straddling equipment, and it is believed that better hay yields will also result from the use of this type of equipment.

Hay fields, resulting from interseeding in corn, are not as smooth as where the hay was seeded in small grain. However, this unevenness of surface has caused very little difficulty as long as the haying operations are performed parallel to the corn rows.

Interseeding in corn provides an excellent rotation for erosion control where combined with plow-plant. The land can be in hay most of the time. The hay is not plowed until the latter part of May. The land is left in a rough-plowed condition until the time of first corn cultivation. Legumes are interseeded early in July, and a good protective cover of legumes is established by the last of July.

Pineapples in Puerto Rico

Soil conservation measures and mechanized operations go hand-in-hand in the pineapple-expansion program of Puerto Rico.

By R. L. VON TREBRA

IN July 1956, the Puerto Rico Land Authority, which owns and operates most of the pineapple-producing land of the Island, began a 5-year program that calls for increasing the pineapple acreage approximately seven or eight thousand acres.

A modern pineapple-processing plant, costing approximately $4 million, is being constructed 4 miles west of Manati, in the Norte Soil Conservation District, in the heart of the pineapple-producing area. The plant should begin operations in 1957.

The Land Authority and the Norte and Atlantico Soil Conservation Districts, assisted by the Soil Conservation Service, started the planting program with conservation practices as a "policy." During the first 5 months, more than 900 acres were planned, laid out, and planted, using such conservation practices as contour planting, terracing, grass waterways, and water-management controls.

A number of problems had to be overcome before practical and successful conservation planting could be done. For example, pineapple operations are rapidly becoming mechanized. Field operations, such as cultivation and spraying and much of the picking, are done with machinery which cannot operate around sharp turns in contour rows.

Many contour layouts, due to irregular topography, must be modified. The same is true with land that is terraced and contour planted. SCS personnel had to plan and lay out parallel terraces where practical. Land Authority personnel had to see the value and relationship of practices and be trained in terrace construction.

Water disposal and management, involving terraces and waterways, was another problem

Note.—The author is director, Caribbean Area, Soil Conservation Service, San Juan, P. R.

Terraced pineapple field in Puerto Rico. Terrace channels are used as access roads.

complicated by lack of experience with such measures. In general, this lack of experience applied to Soil Conservation Service personnel as well as Land Authority field personnel. Not all fields can be terraced, but most fields usually need bermudagrass waterways whether terraced or only contour planted.

In the Norte district only one large field of 40 acres had been terraced by the end of 1956. More fields would have been terraced, however, if equipment had been available.

In the Atlantico district, 225 acres of new pineapple land were laid out and planted between parallel terraces. In addition, 225 acres were planted in modified contour rows.

In the Norte and Atlantico districts, between 1,700 and 2,000 acres of conservation-planted pineapple lands should be put in during 1957.

"Mechanization" of pineapple production in Puerto Rico, including conservation production methods, is a new but promising venture. Answers to all the problems are not yet available, but they're coming fast. Adjustments in conventional access roads to fit into terrace- and water-disposal systems must be carefully planned. Plans must be made for meeting the problems of picking, machinery operation, and reduced labor and machinery costs. To date, it is evident that the right answers can be worked out. Puerto Rico is now on the way to solving its pineapple-production problems with conservation methods.

Terrace construction in Puerto Rico on land to be planted to pineapples.

DISTRICT PROFILE

CYRIL CRAWFORD of MINNESOTA

CYRIL Crawford of Winona, Minn., better known as just plain "Cy" Crawford to hundreds of Minnesota farmers, is one of America's top salesmen for soil conservation. When he delivered the keynote address at the convention of the National Association of Soil Conservation Districts at St. Louis, in February 1957, thousands of other conservationists became acquainted with him.

Minnesota "soil savers" applauded selection of "Cy" Crawford for the national keynote address. Many met him for the first time at Winona, Minn., in 1950, when he handled convention arrangements for the state association.

"Right away we learned he could think on his feet and wasn't afraid to fight for his objectives," says Ted Hegseth of Fergus Falls, a past president of the Minnesota organization. "Cy loves nothing better than a good scrap and he gives a good account of himself. At the same time, Cy understands that the soil conservation movement is one that requires full cooperation by all government agencies. He stresses that theme in his talks wherever he goes."

A dynamic speaker, Cy Crawford is constantly urging district supervisors to serve as "quarterbacks" on the drive against soil depletion.

"The glory in the soil and water conservation program is so great," he assures his listeners, "that there is plenty to go around. However, we must remember that it's up to us as district supervisors to get the job done. We're the boys who must direct the program in our various districts to see that farmers stop losing their topsoil through wind and water erosion."

When Crawford addresses an audience, it's difficult to believe his formal education ended at the eighth grade. A native of Buffalo County, Wis., he was raised on a farm about 10 miles west of Arcadia. He attended a country school near Arcadia but quit school after going as far as he could there.

"That was a mistake," he admits. "When I became an apprentice machinist at Duluth, I took a lot of ribbing from the other fellows. I was a 'country hick' to them and they rubbed it in. I took so much ribbing from them that I finally decided to go to night school. I learned more in 6 weeks at that school than I would have learned in 6 months in high school."

After working less than two years as a machinist, young Crawford decided he wasn't going to be happy in the city. He became a salesman for a feed company at Stillwater, Okla.

"It was the same story there," Crawford admits ruefully. "I could sell feed, but I was handicapped by lack of an education. Finally, I realized that I needed to take special courses in animal nutrition if I was going to keep up with the college-trained men. That meant going to college. Since I lacked high school credits, I had to talk the professors at Oklahoma A. & M. College into letting me sit in on some of their classes whenever I was in Stillwater."

Crawford's big break came in 1933. The J. R. Watkins Co. had established an experimental farm near Winona. A capable man was needed to direct its affairs and Cy Crawford got the job.

From a soil-erosion standpoint, the farm was in poor condition. Whenever a drenching rain fell, the water would race down the sloping rows and carry off untold tons of topsoil. Huge gullies began to form and grow deeper and longer, while soil fertility was greatly depleted.

"Gullying posed a major problem to me as manager of the farm," Crawford says. "I did the best I could—which was practically nothing. The farm looked like a losing proposition to me because there was nobody around to whom I could turn for help."

Then a CCC camp was established in the Gilmore Valley area. The CCC workers began laying out fields on the contour. Crawford went down to see what was being done and decided that contour strips could solve most erosion problems on the experimental farm he was managing.

"I coaxed the technicians in the Gilmore Valley project to come over in their spare time and lay out strips," Crawford recalls. "That was in the fall of 1936. They were the first strips on a Winona County farm and the neighbors got many a laugh from those crocked rows."

Cyril Crawford directing farming operations over the farm's special communications system.

Today—nearly 21 years later—neighbors no longer chuckle over those contour strips. In fact, many of them now have switched over to similar conservation practices.

Crawford took a leading role in establishing the Burns-Homer-Pleasant Soil Conservation District. This was the first one organized in the State.

"This district also has the distinction of being one of the first in the Nation organized on a watershed basis," Crawford emphasizes. "It comprises three natural watersheds. We like to point out that it was achieved long before the small watershed program was established."

After the district was organized, Crawford chose to take a back seat in its affairs.

"I just assumed that every farmer in the area would start asking for technical help," he says. "I knew that practically every farm in the district needed a well-planned conservation program. But, to my surprise, very few farmers took advantage of the technical help."

In the spring of 1948, Crawford became a district supervisor, replacing one of the original members. He became a zealous advocate of the program, urging his neighbors to get rid of the gullies and establish contour strips.

In 1950, when the State convention was held in Winona, Crawford had charge of arrangements for the event. He did such an efficient job that he was elected an area director. Four years later he became president of the State association and served two 1-year terms.

—HAROLD SEVERSON

THE CHURCHES' RELATION TO CONSERVATION

By JAMES W. SELLS

THE future of America depends upon our natural and renewable resources. The pressure of an increasing population makes more important the necessity for a continued study of man's relationship to the land on which he lives.

There must be a continued understanding of the emphasis on the theme, "Man, Land, and God." God gave man life and made the land on which he was to live. Remove any point of this triangle and the whole framework falls. Too long we have looked upon conservation of our soil and water resources as purely an economic responsibility.

We must understand that this is a spiritual matter. We cannot develop Christian character of worth and value without the resources that come from the right use of soil and water. If man is to be anything more than an economic being it must be realized that he has a spiritual value. Whatever happens to the land eventually brings its fruits to or takes its toll from the life of man.

The Church is concerned with the ultimate values of life. The Church is of God and for man; and, therefore, must live off of the land. Poor soil always makes poor people. But, good land only makes possible good people. The Church is consequently concerned about the quality of life, and the quality of soil on which people live and from which our food comes.

Increasingly, churches, both rural and urban, are promoting programs that have to do with the spiritual interpretation and right use of our soil and water resources.

The authority for all of this is to be found in the Bible, because God created man and placed him in a garden and told him to dress it and keep it. God gave man the land and told him "to have dominion over all things."

The ultimate value of our stewardship of life rests upon our stewardship of our material and renewable resources.

Note.—The author is executive secretary, Southeastern Jurisdictional Council, The Methodist Church.

RANGE MEN DISCUSS GREAT PLAINS.—The distinctive character of semiarid country, as contrasted to either arid or humid, is the crux of the Great Plains problem. This was a unifying theme of the tenth annual meeting of the American Society of Range Management at Great Falls, Mont., in January 1957.

The opening session was devoted to "Ranching in the Northern Great Plains". Descriptive and analytical papers on the same subject appeared throughout the 3-day program on research, extension, range-improvement techniques, and economics of rangeland use.

"We must accept semiaridity as a working fact," said Karl Kraenzel, professor of sociology at Montana State College. He emphasized that: The semiarid region is not simply an intermediate transition between humid and arid, but has peculiar characteristics of its own. Successful adjustment to the environment requires that these conditions be recognized.

J. B. Campbell, in charge of the pasture section, Dominion Experimental Farms, Swift Current, Saskatchewan, Can., described some of these peculiar features in his talk: The greatest problem is the variability of rainfall, not the amount, he pointed out. Rivers of the area are troughs that carry snowmelt from the mountains, rather than drainage systems for local precipitation. These and other features set the semiarid plains apart.

Arnold Heerwagen, SCS range conservationist, Denver, Colo., described examples of range sites in the central Great Plains, pointing out great differences in productivity within the same locality. Most of the conservation and management problems come from basing management expectations on potentials characteristic of more humid and less variable climate, he stated.

The meeting attracted the largest attendance in the history of the range society. Out of a membership of slightly more than 3,100 range technicians, administrators, and ranchers, 474 registered. Ranchers comprise about 20 percent of the membership.

—BEN OSBORN

TREE SPRAYING BY AIR.—Several Oregon tree farmers have made profitable use of airplanes in controlling brush in their young fir stands.

Rudy Bauder, tree farmer at Willark, said aerial spraying successfully controlled willows, snow brush, cherry, and other brush species. However, vine maple did not respond to the treatment, he said.

—*The American Tree Farmer*

THE FUTURE OF ARID LANDS. Gilbert F. White, editor. 453 pp. Illustrated. 1956. Washington: American Association for the Advancement of Science, Publication No. 43. $6.75

THE International Arid Land Meetings in New Mexico, April 26 to May 4, 1955, brought together scientists and technical workers from 17 widely scattered nations under the sponsorship of the American Association for the Advancement of Science.

Their discussions of arid-land problems were organized around four dominant themes: (1) Variability and predictability of water supply, (2) better use of present resources, (3) prospects for additional water sources, and (4) better adaptation of plants and animals to arid conditions.

The papers presented in the meetings and the recommendations resulting from them are made available in this book.

Along with a great deal of familiar information, and much not so well known, are a number of fresh and stimulating ideas about land use possibilities in lands where water is scarce. In this country, people concerned with the Great Plains program will find this book pertinent to their interests.

There is, for example, penetrating discussion of the possibilities of selecting, breeding, and improving plants and animals for arid conditions rather than concentrating upon adjusting the arid environment for plants and animals imported from humid areas.

A suggestion that arid lands look toward industrial rather than agricultural expansion is supported by one speaker, who states:

"Actually . . . agriculture is a marginal use of water. In the United States the water that will support one worker in arid-land agriculture will support about 60 workers in manufacturing . . .

"Let the humid regions ship food into the arid, since with the arid lands reaching the limit of their water supply, the humid regions can produce more efficiently anyway and have by no means reached the limits of their capabilities."

These are just two examples of the many viewpoints covered. The whole range of thinking is recorded without attempting to reconcile differences of view or fill obvious gaps. No single, clear answer emerges. But the reader will have his understanding of arid-land problems broadened by thoughtful attention to the symposium papers.

—BEN OSBORN

SOIL CONSERVATION. By J. H. Stallings. 575 pp. Illustrated. 1957. New Jersey: Prentice-Hall, Inc. $8.50

THE author has drawn on information and research data from about 600 authors to write this book, and he has documented the efforts and accomplishments of the soil and water conservation movement during the past 20 years.

The first 2 chapters deal with the historical phase of erosion and the more recent recognition of the problem since 1930. The remaining 23 chapters are concerned with the fundamental considerations of conservation, practices, and types of conservation farming, as well as farm and watershed planning. In the chapter dealing with how water erodes soils, special emphasis is given to how "raindrop splash" causes soils to move. The 3 types of soil movement; namely, saltation, suspension, and surface creep, are explained in the chapter on wind erosion.

Subjects such as mulch farming for row crops, stubble-mulch tillage, grassland and woodland farming are included, along with general principles of irrigation and water disposal.

Numerous illustrations are included covering a wide range of conditions that show causes, effects, and principles of control measures. Each chapter includes a comprehensive list of references for those who desire additional information on the subject.

The book is written for use in colleges and universities as a text or reference. It is also valuable as a reference for agricultural workers.

—B. D. BLAKELEY

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SOIL CONSERVATION STUDY.—All students in the seventh through the twelfth grades of the Bluffton High School in South Carolina, participated in a 2-day study of the various phases of conservation in October 1956. The emphasis was on soil and water conservation. The 2-day course was a cooperative activity between the school, the Beaufort-Jasper Soil Conservation District, and the Soil Conservation Service.

The first day was devoted to classroom work. Various topics were given by specialists using the lecture method supplemented by audio-visual aids.

The second day was spent on a field trip to Cypress Woods Plantation near Ridgeland, where students could observe practices applied to the land.

The teachers of the respective grades attended all discussions and went on the field trip. All teachers highly praised the 2-day study. District supervisor, H. E. McCracken, who is also the school superintendent, was highly pleased with the results.

Students generally were impressed and can now speak some of the "lingo" of a conservationist. Teachers are planning to use the background material, gained by the study, to present a fuller and richer course in the proper care of natural resources.

—RAY E. MCLIN

HELICOPTER USED FOR TREE SPRAYING.—A helicopter was used to spray small woodland tracts in eastern Tennessee in a recent experiment on controlling weed trees.

The chemical used was 204-5-T. The experiment was conducted by a large tree farm in an attempt to develop an economical method whereby tree farmers could remove low-grade hardwoods and free small pine seedlings for rapid growth.

—*The American Tree Farmer*

LAND JUDGING.—The Soil Judging program held in Kentucky for the second year was highly successful. In the 9 FFA District contests 90 teams entered, while 42 teams were entered in the 9 4-H Club District contests. More than 1,400 FFA and 4-H Club boys participated in soil judging activities in 1956. Commercial interests provided $900 for awards.

SUNFLOWERS FOR PHEASANTS.—Pheasants should have a better chance to survive this winter, thanks to combined efforts of local farmers, the Clay County Soil Conservation District, and the Glydon Rod and Gun Club. During the past 4 years, the club and soil conservation district gave the district's technical staff 200 sacks of sunflower seeds to distribute to farmers. Most of the seeds were planted in rows along the edge of corn fields or along windbreaks. Les Pulkrabek, work unit conservationist, says, "When they're properly planted and cared for, the seeds will be available to pheasants during the winter when other foods are covered by snow."

—*The Conservation Volunteer, Minn.*

FOREST SOIL NOT DEPLETED BY TIMBER HARVESTS.—Forest soil is not depleted by timber removal, according to Dr. Chet Youngberg of the Oregon State College Forestry Soils Department.

"Although an average acre of Douglas fir forest land may yield 450 tons of wood at the time of harvest, less than 1 percent by weight is made up of soil nutrients, including nitrogen and other inorganic compounds," said Dr. Youngberg.

"During the 80 to 100 years required to produce a log crop, this depletion is more than replaced by the weathering of minerals in the soil and by addition of nitrogen by rainfall and the action of nitrogen-fixing organisms in the soil."

—*The American Tree Farmer*

CONSERVATION FELLOWSHIPS. — The Graduate School of Public Administration at Harvard is offering for the academic year 1957-58 eight fellowships for advanced study and research in the field of the renewable natural resources.

The purpose of the fellowships is to provide training in the administration, management, and development of renewable natural resources for men with experience in the field, and a bachelor's, or more advanced, degree.

The staff conducting the school will come from eight university departments giving instruction in this subject.